Does the Relationship Between Smoking and Weight Promote Either the Initiation or Maintenance of Smoking Behavior?

Some research attention has been given to body weight as a potential moderator of smoking initiation, maintenance, and cessation. Unfortunately, many investigations do not report weight-related issues (Borkon, Baird, Siff 1983; Eiser et al. 1985; Pederson and Lefcoe 1976; Perri, Richards, Schultheis 1977). The investigations that have evaluated these issues consistently report relationships between body weight and smoking initiation (Charlton 1984a) and maintenance (Klesges and Klesges, in press).

A survey of 16,000 school children (Charlton 1984a) in England found that the heaviest regular smokers were the most likely to agree that smoking controls weight (42.2 percent) compared with those students who never smoked (16.6 percent). Agreement increased with increased levels of smoking. More girls than boys agreed with this statement, and girls were also more likely to be regular smokers. Charlton (1984b) also reported that among the perceived effects of smoking, smokers viewed "calming the nerves" as the most popular reason (72 percent) followed by "smoking keeps your weight down" (39 percent).

Other investigations are consistent with the Charlton (1984a,b) report. In a recent study of 1,000 adolescents in Canada (Feldman, Hodgson, Corber 1985), significantly more girls than boys were concerned about becoming overweight (36 vs. 14 percent, $p<0.001$). In girls 18 years or older, 52.6 percent of smokers reported worrying about their weight, whereas only 31 percent of nonsmokers reported weight-related concerns ($p<0.05$). In a study of smoking intentions among 400 U.S. high school males, Tucker (1983) reported that overweight boys scored much higher on smoking intent than either normal weight or underweight boys ($p<0.005$). Another survey evaluated gender differences in a sample of 221 college cigarette-smoking intenders and nonintenders (Page 1983). Results indicated that females were much more likely to intend to smoke than males. Females were also more likely to believe that smoking maintains body weight, and smoking intenders were also more likely to believe that smoking controls weight. Finally, in a retrospective survey of more than 1,000 young adults (Klesges and Klesges, in press), overweight females reported that they were much more likely (20 percent) to start smoking for weight-related reasons compared with normal-weight females (2 percent). No differences between overweight versus normal-weight males (8 vs. 6 percent) were observed.

Several surveys on smoking maintenance have shown that individuals report that weight control is a powerful motivator to continue to smoke. Physicians who smoked were much more likely than those who had quit (46 vs. 22 percent) to believe that smoking cessation increases appetite and weight (Fletcher and Doll 1969). Nurses who failed to quit smoking listed (in order) loss of determination, stress, and weight gain as the major reasons for failure (Knobf and Morra 1983). Beliefs regarding the weight-control effects of smoking and quitting differentiate smokers and nonsmokers (Hill and Gray 1984; Loken 1982; Shor et al. 1981). Females are particularly worried about postcessation weight gains (Klesges and Klesges, in press; Sorensen and Pechacek 1987). They are more likely to endorse smoking as an active weight-loss strategy (39 vs. 25 percent) and are more likely to report relapse for weight-related reasons (20 vs. 7 percent) (Klesges and Klesges, in press).

The research cited above is based on self-reports of the weight-control effects of smoking and, as such, could be viewed as an excuse for smoking. Two recent worksite-based investigations evaluated whether pretest concerns regarding smoking and weight-related issues prospectively predicted cessation. Maheu (1985) evaluated 49 subjects who either received a competition-based ($n=32$) or a no-competition condition ($n=17$). In the competition-based condition, participants were told that they would be rewarded if those at their worksite lost more weight than those at a neighboring worksite. At a 3-month followup, 78 percent of the subjects in the competition and 76 percent of the subjects in the no-competition condition were reportedly abstinent. Regression analysis at followup indicated that the best pretest predictors of smoking cessation (in order) were negative responses to the questions: (1) "Do you think smoking helps control your weight?"; (2) "Did one of your parents smoke when you were young?"; and (3) "If you have tried to quit before, did you suffer any withdrawal symptoms?" Klesges, Brown, and associates (1987) found that the best predictors of cessation at posttest were pretest cotinine levels and anticipated weight gain as the result of smoking cessation. The best predictors of cessation at followup were the number of coworkers who smoked followed by anticipated cessation-related weight gain.

A recent community survey evaluated predictors of current and former smoking status in a sample of 611 nonsmokers, ex-smokers, smokers who had tried to quit smoking, and smokers who had not attempted cessation (Klesges, Somes et al. 1987). The best predictors of smokers who had never attempted cessation versus those with a history of cessation efforts were a greater concern related to weight control, followed by knowledge of the health consequences of smoking. Smokers who had not attempted cessation were significantly more likely to cite weight-control issues compared with smokers who had made active attempts at smoking cessation. Collectively, these investigations indicate that weight-related concerns may not only pred successful smoking cessation, but also attempted smoking cessation.

Weight gain following smoking cessation as a predictor of smoking relapse has been evaluated in two recent investigations. Hall, Ginsberg, and Jones (1986) found a relationship between smoking status at a 1-year followup and weight gain at 6 months; greater weight gain during the first 6 months predicted continued abstinence. This finding was contrary to expectations. In another investigation, Critz, Carr, and Marcus (in press) found that continuous abstainers had gained an average of 6.1 lb, relapsers had gained 2.7 lb and subsequently lost half the gain (1.3 lb), and never quitters had gained only 0.3 lb. While it was expected that postcessation weight gain would be predictive of relapse, one would expect that those who have been abstinent from cigarettes would have gained more weight than those who either failed to quit or those who relapsed, because these latter groups have regained the weight reducing effects of smoking. Additional research will need to evaluate the impact of weight gain on relapsers at the point of relapse compared with the impact on abstainers at a comparable point in time. Further, it is clear that actual weight may have little relationship with subjects' perceptions of their weight status. For example, overweight males consistently view themselves as normal weight, while underweight and normal-weight females consistently view themselves as overweight (Klesges 1983). Very small weight gains in some subjects (e.g., normal-weight females) may be much more predictive of relapse than very large weight fluctuations in others (e.g., overweight males) (Klesges 1983). Future research should evaluate potential variables (e.g., gender, obesity) that may moderate the relationship between weight gain and smoking relapse.

In summary, weight-related issues may be important in the maintenance and cessation of smoking. Weight-reducing effects of smoking may encourage smoking initiation by some people, but the data on this point are currently unconvincing. Future research should focus on who (e.g., males versus females, those with a history of chronic dieting) is most at risk to smoke because of weight-related concerns. In particular, prospective studies on weight-related issues as they predict smoking initiation, cessation, and relapse are needed.

Implications for Tobacco Use

Cigarette smokers weigh less than comparably aged nonsmokers, and many smokers who quit smoking gain weight. This inverse relationship between smoking and body weight is well established, and the role of food intake and energy expenditure as mechanisms for this relationship is currently receiving research attention. The postsmoking weight gains are frequently undesired by the ex-smoker. People are quite aware of the relationship between smoking and body weight, and this relationship may encourage some people to initiate smoking and to keep smoking. However, other people may

modify food intake and avoid weight gains after cessation of smoking.

Summary and Conclusions

1. After smoking cigarettes or receiving nicotine, smokers perform better on some cognitive tasks (including sustained attention and selective attention) than they do when deprived of cigarettes or nicotine. However, smoking and nicotine do not improve general learning.
2. Stress increases cigarette consumption among smokers. Further, stress has been identified as a risk factor for initiation of smoking in adolescence.
3. In general, cigarette smokers weigh less (approximately 7 lb less on average) than nonsmokers. Many smokers who quit smoking gain weight.
4. Food intake and probably metabolic factors are involved in the inverse relationship between smoking and body weight. There is evidence that nicotine plays an important role in the relationship between smoking and body weight.

The Health Consequences Of Smoking

NICOTINE ADDICTION

a report of the Surgeon General

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
Center for Health Promotion and Education
Office on Smoking and Health
Rockville, Maryland 20857

CHAPTER VI

EFFECTS OF NICOTINE THAT MAY PROMOTE TOBACCO USE

CONTENTS

Despite the well-known health hazards associated with cigarette smoking and tobacco use, more than 50 million Americans continue to use these products. (See Chapter I for a brief review of health hazards and Appendix A for prevalence of use data.) Chapter IV presents evidence that tobacco use is an orderly form of drug-seeking behavior that involves nicotine self-administration. It is clear from Chapter IV that tobacco use involves several biobehavioral processes of drug dependence, including nicotine reinforcement and withdrawal. The initiation and maintenance of this dependence process may be promoted by other actions of nicotine. For example, some cigarette smokers report that smoking helps them to think better, to cope with stress, and to keep body weight under control. The fact that people believe that tobacco use has these effects may contribute to initiation, maintenance, and relapse.

This Chapter examines the evidence on the following three effects of nicotine:

- enhancement of human performance
- control of stress responses
- control of body weight.

These particular topics are presented because there is scientific literature relevant to each topic and because nicotine has been suggested to be central to each of these effects.

The three topics are discussed separately in this Chapter because the substantive material and relevant data are distinctly different for each topic. Also, the research on each topic is at a markedly different evidentiary stage at this time. Whereas studies on nicotine and performance are intriguing, there are some serious methodological concerns that force caution in the interpretation of the available experimental investigations. In contrast, the relationship between stress and smoking (i.e., that stress increases smoking) is well documented by self-report data, and several investigators have offered detailed theoretical explanations and mechanisms to account for this phenomenon. However, much of this speculation has preceded experimental investigations. In still another stage of investigation, extensive data have been gathered on the relationship between cigarette smoking and body weight, and laboratory studies have carefully assessed the role of nicotine. Explanations for the relationship between nicotine and body weight are based on investigations that were designed to test specific variables involved in this relationship. All three topics are currently receiving research attention and are considered to be important areas for more extensive investigation. This Chapter is meant to complement the information presented in Chapter IV to provide a more complete understanding of tobacco use. Most of the studies discussed in this chapter have examined effects of cigarette smoking. Some studies present data on effects of nicotine alone. The similarity in findings of